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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/922,324	08/02/2001	Daphne Koller.	STAN0001	7457

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EXAMINER

TRUONG, CAM Y T

ART UNIT	PAPER NUMBER
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2172

DATE MAILED: 06/30/2004

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/922,324

Applicant(s)

KOLLER ET AL.

Examiner

Cam Y T Truong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-12 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-12 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

1. Applicant has canceled claims 1-8, 13-15 and added claims 16-18 in the amendment filed on 4/2/04.

Applicant's arguments with respect to claims 9-12 and 16-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 9-12 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art Friedman et al, "Learning Probabilistic Relational Models", In Proceedings of the 16 th International Joint Conference on Artificial Intelligence, pages 1300-1307, Stockholm, Sweden, 1999 (or hereinafter "Friedman") in view of admitted prior art Getoor et al, "Learning probabilistic Relational Models with Structure Uncertainty", In Proceedings of the AAAI-2000 Workshop on Learning Statistical Models from Relational Data, 2000 (or hereinafter "Getoor").

As to claim 9, Friedman teaches the claimed limitations:

"providing a parameter estimation task by: inputting a relational schema that specifies a set of classes, having attributes associated with said classes

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having relationships between objects in different classes" as providing parameter estimation and structure learning. A relational model consists of a set of classes X_1, \dots, X_n and a set of relations R_1, \dots, R_m . Each entity is associated with a set of attributes $A(X_i)$. Each attribute A_j belongs $A(X_i)$ takes on values in some fixed domain (page 1, col. Left, lines 1-18; page 2, col. Left, lines 40-46);

"providing a fully specific instance of said schema in the form of a training database" as an instance I of a schema defines a set of entities $O(x_i)$ for each entity type x_i . For each entity x belong $O(x_i)$ and each attribute A_j belong $A(X_i)$, the instance has an associated attributes $x.a_j$; its values in I is denoted $I.x.a_j$. Each relational model is the most common representation of structure data. Enterprise business information, marketing and sales data, medical records, and scientific datasets are all stored in relational database. Thus, the above instance I of a schema may be stored in form of a relational database. The relational database is represented as a training database (page 1, col. left, lines 25-29; page 2, col. Right, lines 3-8);

Friedman does not explicitly teach the claimed limitation "performing a structure learning task to extract an entire PRM solely from said training database". Getoor teaches learning PRMs from relational database. The system begins by reviewing the definition of a PRM. The PRM is described two ways of extending the definition to accommodate structural uncertainty. Next, the system describes learning methods for these PRMs. The system concludes with some experiment results. The above information implies that each PRM is

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extracted from relational database; thus, the system can analysis a PRM and finally get some experiment results. The relational database is represented as a training database (page 3, lines 1-5).

It would have been obvious to a person of an ordinary skill in the art at the time the invention was made to apply Getoor's teaching of learning PRMs from relational database. The system begins by reviewing the definition of a PRM. The PRM is described two ways of extending the definition to accommodate structural uncertainty. Next, the system describes learning methods for these PRMs. The system concludes with some experiment results to Friedman's system in order to improve standard database retrieval techniques for efficient learning from large datasets and to allow us to present much richer dependency structures, involving multiple entities, prevent losing information, which might be crucial in understanding the data.

As to claim 10, Friedman teaches the claimed limitation "the step of specifying which structures are candidate hypotheses" as (page 6, col. left, lines 8-49).

As to claim 11, Friedman teaches the claimed limitation "the step of evaluating different candidates hypotheses relative to input data" as (page 6, col. left, lines 8-49).

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As to claim 12, Friedman teaches the claimed limitation "the step of searching hypothesis space for a structure having a high score" as (page 6, col. Right, lines 19-34).

As to claim 16, Friedman teaches the claimed limitations:

"inputting a relational schema of the database, the relational schema including a specification of a set of classes, attributes of classes, and specifications of relationship between object in different classes" as providing parameter estimation and structure learning. A relational model consists of a set of classes X, \dots, X_n and a set of relations R_1, \dots, R_m . Each entity is associated with a set of attributes $a(X_i)$. Each attribute A_j belong $A(X_i)$ takes on values in some fixed domain (page 1, col. Left, lines 1-18; page 2, col. Left, lines 40-46);

"inputting a training database that includes a fully specified instance of the schema" as an instance I of a schema defines a set of entities $O(x_i)$ for each entity type x_i . For each entity x belong $O(x_i)$ and each attribute A_j belong $A(X_i)$, the instance has an associated attributes $x.a$, its values in I is denoted $I.x.a_j$. Each relational model is the most common representation of structure data. Enterprise business information, marketing and sales data, medical records, and scientific datasets are all stored in relational database. Thus, the above instance I of a schema may be stored in form of a relational database. The relational database is represented as a training database (page 1, col. left, lines 25-29; page 2, col. Right, lines 3-8);

“including a dependency structure and a conditional probability distribution, the dependency structure including a plurality of nodes and directed edges, wherein each nodes represents a respective attribute of the classes, each directed edge from a first one of the plurality of nodes to a second node of the plurality nodes represents dependency of an attribute represented by the second node on an attribute represented by the first node, the attribute of the first node being a parent of the attribute of the second node, and the condition probability distribution specifying for each attribute, a distribution over possible values of the attribute given all possible values of each parent” as our probabilistic model consists of tow components: the qualitative dependency structure, S , and parameters associated with it, O_s . The dependency structure is defined by associating with each attribute $X.A$ a set of parents $Pa(X.A)$. The attribute $X.A$ can depend on another probabilistic attribute B of X . Consider the parents of an attribute $X.A$. When $X.B$ is a parent of $X.A$, it is defined an edge $x.b \rightarrow x.a$; when $y(X.t.B)$ is a parent of $X.A$ and y belong $x.T$ (page 2, col. Right, lines 39-57; page 3, col. Left, lines 28-42, col. Right, lines 1-16).

Friedman does not explicitly teach the claimed limitation “generating from the training database and the relational schema a probabilistic relational model (PRM)”. Getoor teaches learning PRMs from relational database. The system begins by reviewing the definition of a PRM. The PRM is described two ways of extending the definition to accommodate structural uncertainty. Next, the system describes learning methods for these PRMs. The system concludes with some experiment results. Relational database includes data record and

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relational scheme; thus, PRMs are generated from data and relational schema (page 3, lines 1-5).

It would have been obvious to a person of an ordinary skill in the art at the time the invention was made to apply Getoor's teaching of learning PRMs from relational database. The system begins by reviewing the definition of a PRM. The PRM is described two ways of extending the definition to accommodate structural uncertainty. Next, the system describes learning methods for these PRMs. The system concludes with some experiment results to Friedman's system in order to improve standard database retrieval techniques for efficient learning from large datasets and to allow us to present much richer dependency structures, involving multiple entities, prevent losing information, which might be crucial in understanding the data.

As to claim 17, Friedman teaches the claimed limitation "wherein generating the PRM includes evaluating a plurality of candidate dependency structures, each candidate dependency structure including a plurality of hypotheses, and each hypothesis including a selected set of parents for each attribute" as (page 2, col. Right, lines 39-40; page 6, col. Left, lines 8-34).

As to claim 18, Friedman teaches the claimed limitation "assigning a respective score to each candidate dependency structure using Bayesian model selection, wherein each score is a function of a prior probability of the structure and a probability of attribute values given the structure, and selecting a

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candidate dependency structure having a score that is consistent with selected criteria" as (page 6, col. Right, lines 19-34).

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Contact Information


5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cam-Y Truong whose telephone number is (703-605-1169). The examiner can normally be reached on Mon-Fri from 8:00AM to 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene, can be reached on (703-305-9790). The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703-305-3900).

Cam-Y Truong

6/24/04


SHAHID ALAM
PRIMARY EXAMINER